



## Small and Wide-Temperature Rubidium atomic clock

### Product profile

The TRW70 is a wide temperature Rubidium clock that can adapt to  $-50^{\circ}\text{C} \sim +95^{\circ}\text{C}$ , small size, high reliability, high performance, excellent frequency stability and phase noise, internal integration of 1PPS taming and 1PPS output, and provides an additional 10MHz square wave signal output and external 10MHz signal calibration function, can use cesium clock and hydrogen clock signal as standard for fast automatic calibration of TRW70 frequency. It integrates a highly intelligent digital control system to meet a variety of customized needs of customers, and can fully monitor the health status, with intelligent learning function, allowing users to use atomic clocks more easily and flexibly. All signals of the TRW70 are integrated in a DSUB9 connector, making it more suitable for installations in confined spaces. the TRW70 can also be used as a 10 MHz frequency comparator with an integrated standard.

### Application area



Navigation equipment



Military weapons and equipment



Communications equipment



Wireless base station



Instrumentation

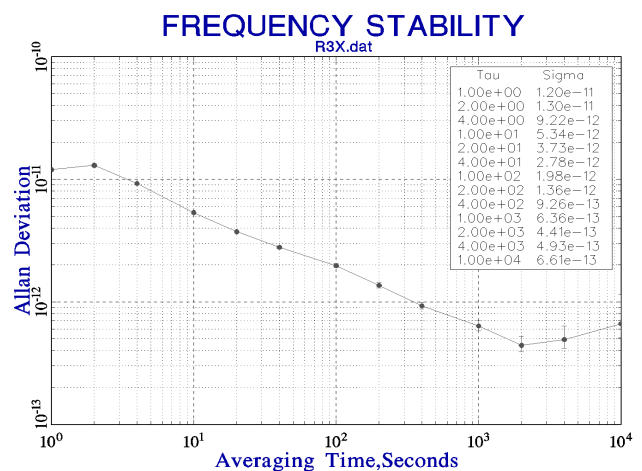


Aerospace

### Product features

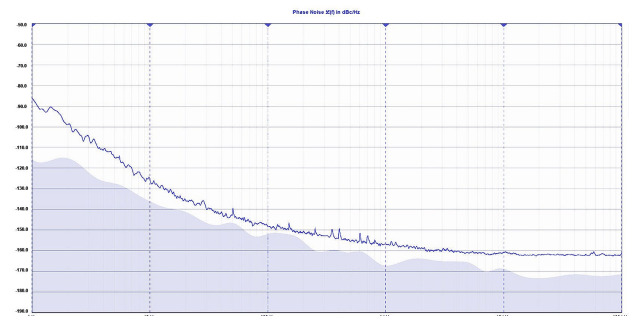
- It can work normally within  $-50^{\circ}\text{C} \sim +95^{\circ}\text{C}$  range
- Small volume  $76\text{mm} \times 76\text{mm} \times 18\text{mm}$
- The short-term stability is better than  $3\text{E}-11 / 1\text{s}$
- Room temperature stable power  $\leq 13\text{W}$
- Low-phase noise, with typical values  $-120\text{dBc}/\text{Hz}@10\text{Hz}$
- 1 PPS taming and 10 MHz calibration

### Typical curve



Typical value of the frequency stability:

|                              |                             |
|------------------------------|-----------------------------|
| 100ms: $2.5 \times 10^{-12}$ | 1s: $1.2 \times 10^{-11}$   |
| 10s: $5.5 \times 10^{-12}$   | 100s: $2.0 \times 10^{-12}$ |
| 1000s: $6.3 \times 10^{-13}$ |                             |

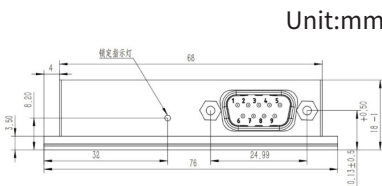
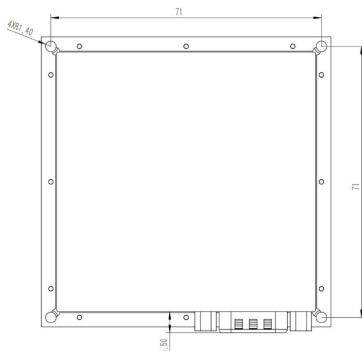


Typical values of the phase noise:

|                                   |                                  |
|-----------------------------------|----------------------------------|
| 1Hz: $-80\text{dBc}/\text{Hz}$    | 10Hz: $-120\text{dBc}/\text{Hz}$ |
| 100Hz: $-147\text{dBc}/\text{Hz}$ | 1kHz: $-157\text{dBc}/\text{Hz}$ |
| 10kHz: $-162\text{dBc}/\text{Hz}$ |                                  |

| Test Item                                 |                              | Technical Indicators  |                              |                            |                              |
|---|------------------------------|---|------------------------------|----------------------------|------------------------------|
| Output frequency                          | Condition                    | 10 MHz, 1-way sine wave (50Ω, ≥ 7dBm) and a 1-way 3 VTTL square wave  |                              |                            |                              |
| Factory accuracy                          |                              | ≤ 5×10 <sup>-11</sup>   |                              |                            |                              |
| Frequency control                         | Voltage pressure control     | 0~5V, with the total range of at least ±5×10 <sup>9</sup>   |                              |                            |                              |
|   | Instruction adjustment       | Coarse adjustment of at least ±1×10 <sup>6</sup> , Fine adjustment range of at least ±1.5×10 <sup>9</sup> , The resolution is better than 1×10 <sup>-12</sup> |                              |                            |                              |
| Locking time                              | Indoor temperature           | ≤ 5min  |                              |                            |                              |
| Frequency stability                       | 1s                           | ≤ 3×10 <sup>-11</sup>   |                              |                            |                              |
|   | 10s                          | ≤ 1×10 <sup>-11</sup>   |                              |                            |                              |
|   | 100s                         | ≤ 3×10 <sup>-12</sup>   |                              |                            |                              |
| Phase noise                               | 1Hz                          | ≤ -80dBc/Hz   |                              |                            |                              |
|   | 10Hz                         | ≤ -115dBc/Hz  |                              |                            |                              |
|   | 100Hz                        | ≤ -145dBc/Hz  |                              |                            |                              |
|   | 1kHz                         | ≤ -150dBc/Hz  |                              |                            |                              |
|   | 10kHz                        | ≤ -155dBc/Hz  |                              |                            |                              |
| Frequency drift rate                      | /Day                         | ±2×10 <sup>-11</sup>  | FD12: ±1.2×10 <sup>-11</sup> | FD5: ±5×10 <sup>-12</sup>  | FD2: ±2×10 <sup>-12</sup>    |
| Frequency reproducibility                 | Switch 24h                   | ±2×10 <sup>-11</sup>  |                              |                            |                              |
| Temperature and Frequency Characteristics |                              | ≤ 5×10 <sup>-10</sup>   | TC3: ≤ 3×10 <sup>-10</sup>   | TC1: ≤ 1×10 <sup>-10</sup> | TC0.5: ≤ 5×10 <sup>-11</sup> |
| Harmonic And Clutter                      |                              | harmonic ≤ -30dBc, clutter ≤ -70dBc   |                              |                            |                              |
| Working temperature                       | Bottom plate temperature     | -40°C ~+85°C  | OT90: -45°C ~+90°C           | OT95: -50°C ~+95°C         |                              |
| Storage temperature                       |                              | -50°C ~+95°C  |                              |                            |                              |
| Power supply                              | ±4%                          | +12V~+15V   |                              |                            |                              |
| Rate of work                              | Preheat                      | ≤ 22.5W   |                              |                            |                              |
|   | Steady state (+25°C)         | ≤ 13W   |                              |                            |                              |
| External Dimension                        | Body size                    | 68mm×68mm×18mm  |                              |                            |                              |
|   | Bottom plate size            | 76mm×76mm   |                              |                            |                              |
| 1PPS input                                |                              | +3V~+5V TTL, Judder<300ns, Pulse width > 100ns  |                              |                            |                              |
| 1PPS output                               |                              | Rising edge / Falling edge: ≤ 10ns, Pulse width: 1us~999ms,   |                              |                            |                              |
| Taming accuracy                           | After 24h of synchronization | Taming jet lag: ±50ns, Time-keeping accuracy: ≤ 1us@24h, Frequency accuracy: ≤ 1×10 <sup>-12</sup> @24h   |                              |                            |                              |

External Dimension



Unit:mm

Pin Definition:

- 1: Ground
- 2:1 PPS-IN
- 3: RS232-TX
- 4: RS232-RX
- 5: Lock indication
- 6: Power supply
- 7:1 PPS-OUT
- 8:10M, sine wave output
- 9:10M square wave output / frequency pressure